

EXPERIENCES IN HIGHER EDUCATION WITH SOS

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Indiana University



**RESEARCH
TECHNOLOGIES**

INDIANA UNIVERSITY

University Information Technology Services



**PERVASIVE TECHNOLOGY
INSTITUTE**

INDIANA UNIVERSITY

OVERVIEW

1. About us
2. How we use SOS
3. Challenges with using SOS
4. Overview of SOS projects
5. Highlights of specific SOS projects

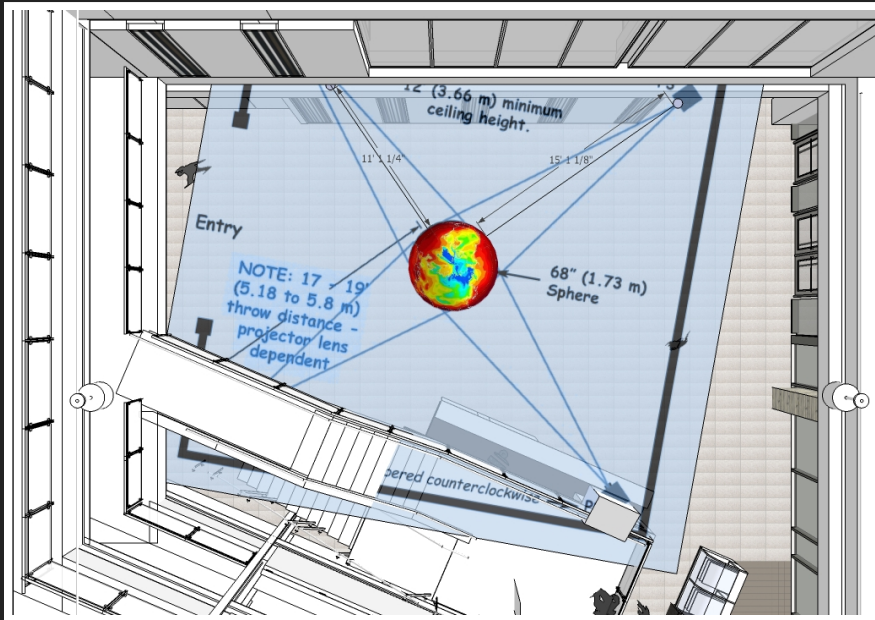
IU ADVANCED VISUALIZATION LAB

*"promote the innovative application of
visual technologies to advance Indiana
University's missions in research,
education, creative activity, and
community outreach."*

WHY SOS AT IU?

- Put state university in global context
- Students from 49 states and 165 foreign nations enrolled in 2014
- 70+ foreign languages
- International networks: ACE, TransPAC, etc
- School of Global and International Studies

SOS IN THE CIB



SOS IN THE CIB

- Suspended from ceiling in large, open lobby
- Staff on hand experienced with unique displays
- Runs passively throughout the day, but can be reserved for events

HOW IS THE SOS USED AT IU?

- Building tours
- Class support: School of Fine Arts, Science Olympiad
- Special events: SOS Week, SOS After Dark
- Signage during non-SOS events

SOS Week with Ingo Günther



Figure 1. Visitors gather at the "SOS After Dark" outreach event. The event started at 8:30pm which offered prime viewing of the projected Sphere with no incoming sunlight and featured a variety of visualizations on the Science on a Sphere display, the IQ-Wall, and Gunther's WorldProcessor exhibit.

CHALLENGES WITH SOS AT IU

CHALLENGE

Physical location: lobby with glass walls, lots of light

RESPONSE

- Keep lobby lighting low
- Draw shades on sunny days
- Schedule SOS-centric events after sunset

CHALLENGE

Many researchers don't have global data

- US only ~2% of Earth
- Indiana only ~1% of US

RESPONSE

- Embrace it!
- Repeat relevant sections
 - See Vincent Keller's talk on the SOS Splitter tool
 - Thursday 2pm Theater Lobby

CHALLENGE

Most interest comes from outside the scientific disciplines

RESPONSE

- Embrace it!
- Develop new techniques
- Create our own datasets

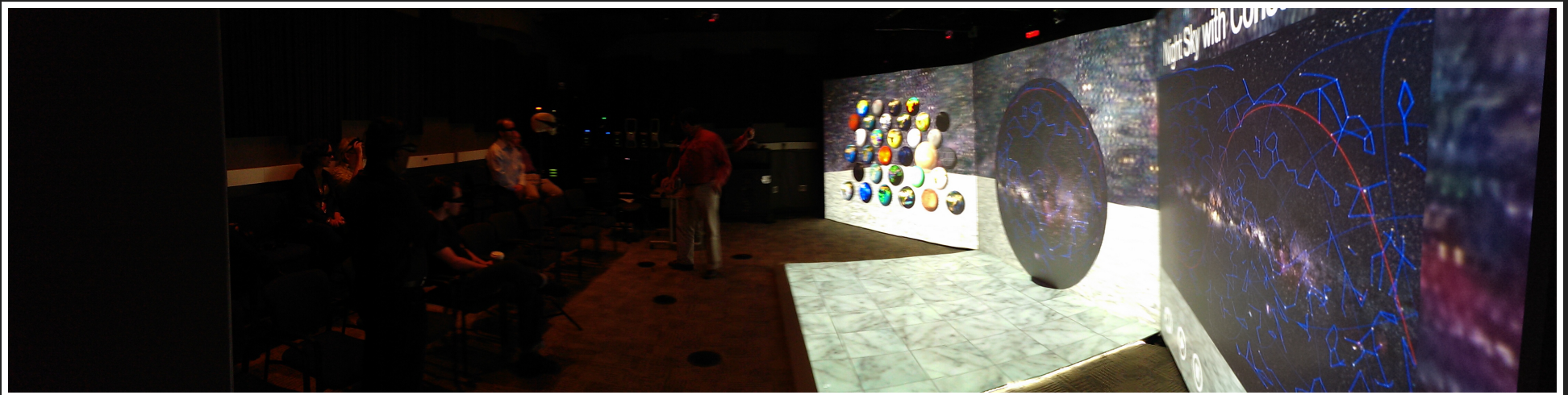
OVERVIEW OF SOS PROJECTS

- Non-Dataset, SOS related Projects
- Datasets

X3D Emulator



X3D Virtual Reality Emulator



Single User Kiosk



Science on a Sphere at IU

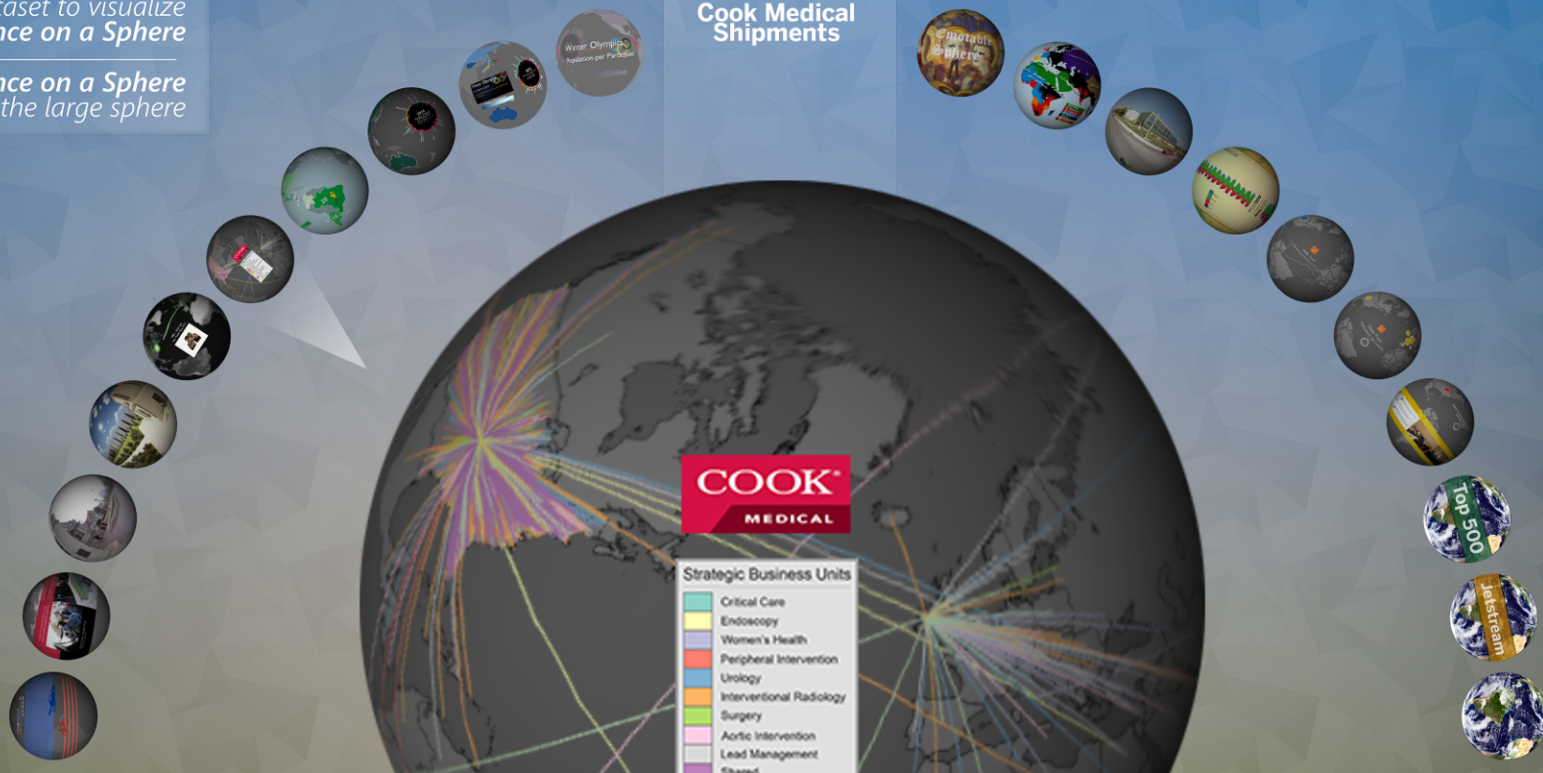
Enabled and supported by the UITS Advanced Visualization Lab,
a unit of Research Technologies. Send inquiries to vishelp@iu.edu.

This dataset visualizes shipments by Cook Medical during a period of one week, demonstrating the global impact of this local company. Each arc represents one shipment, whose color indicates the product category. Today, Cook Medical is the world's largest privately held medical device manufacturer.

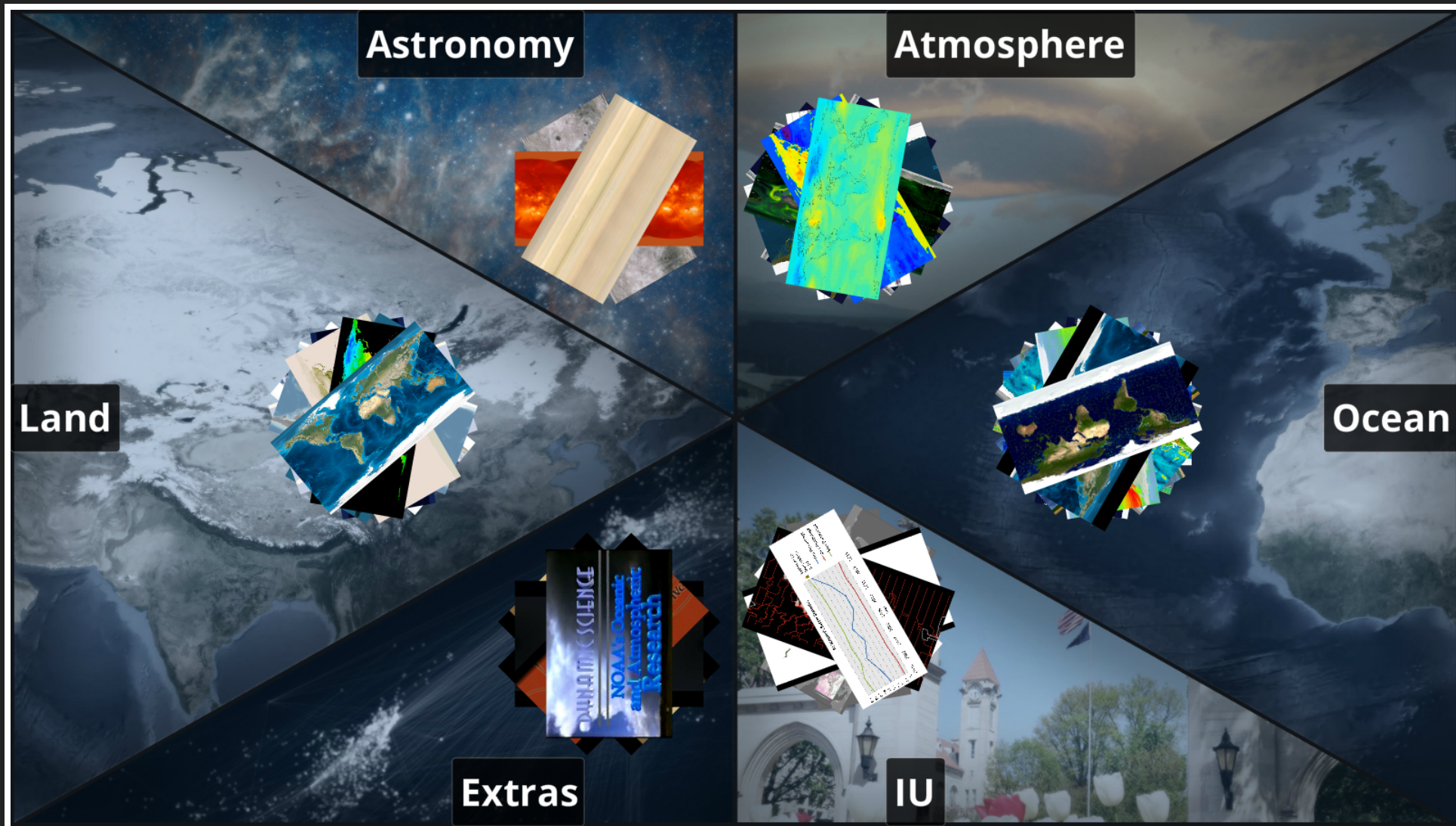
Touch a dataset to visualize
it on **Science on a Sphere**

Rotate **Science on a Sphere**
by dragging the large sphere

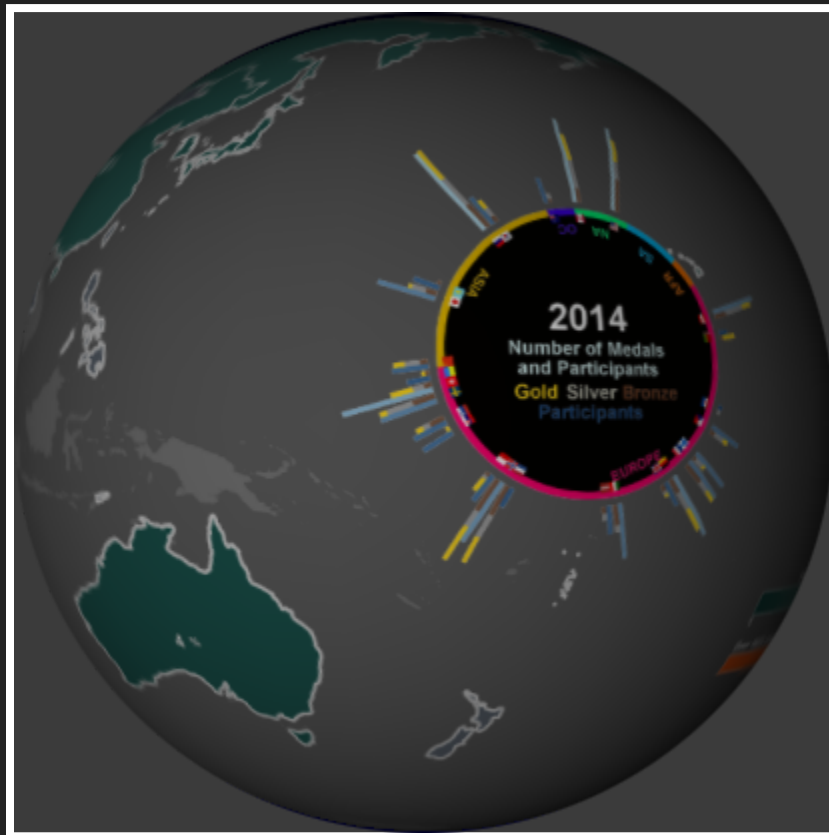
Cook Medical Shipments



Multi User Kiosk



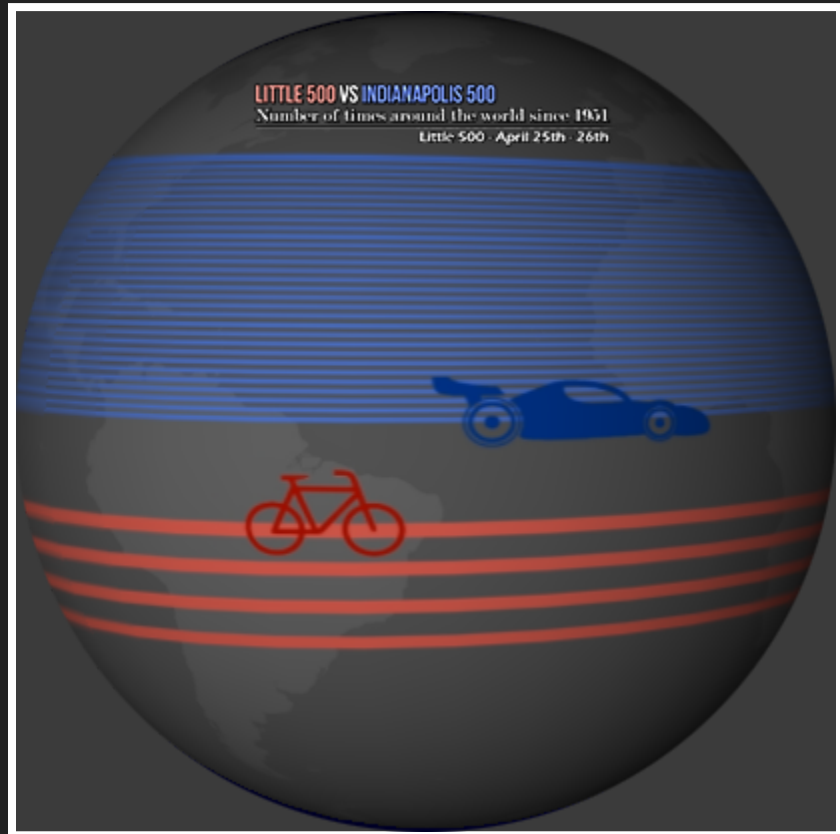
Winter Olympics & World Cup



Local & IU Data



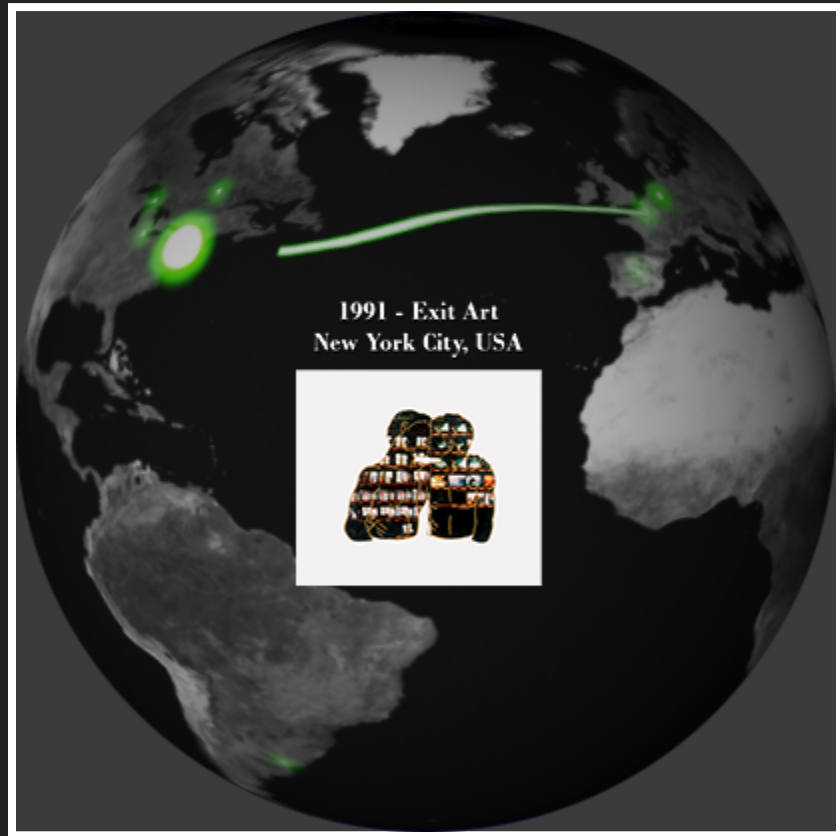
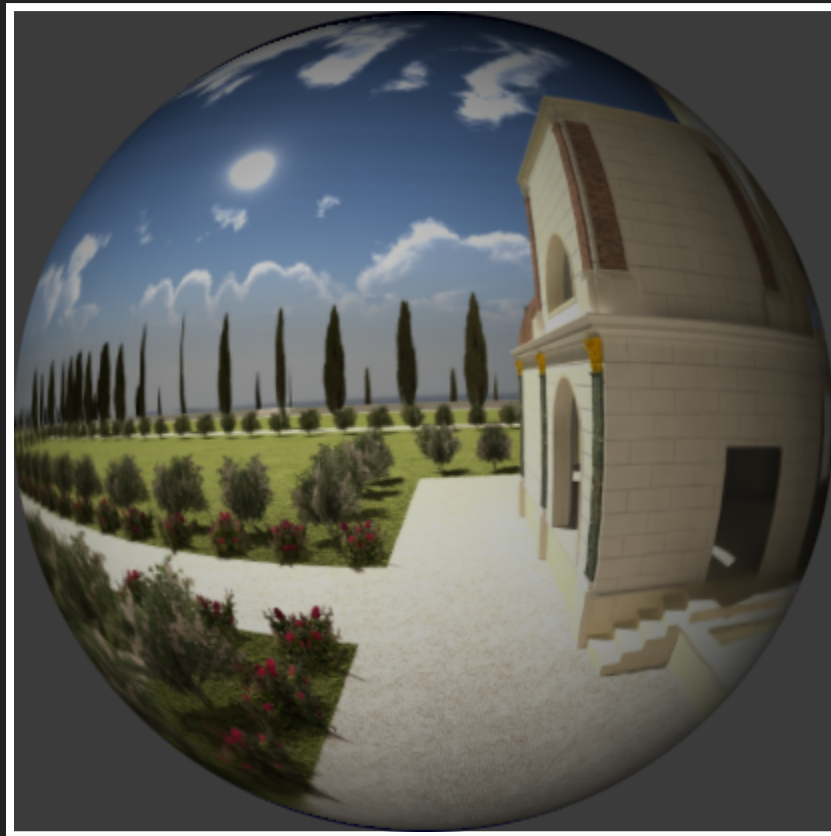
Digital Signage



PowerPoint & 360 Panoramas

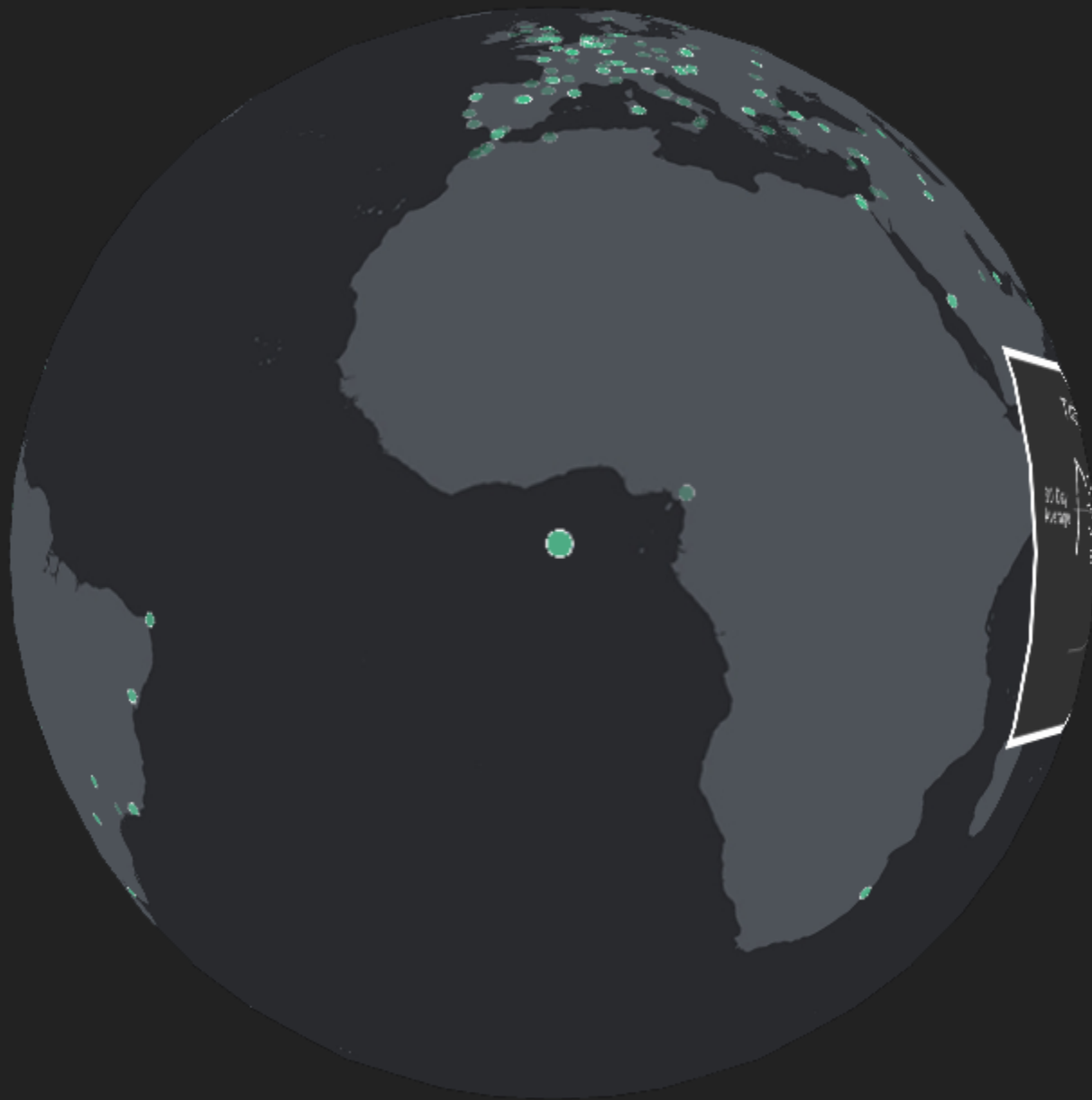


3D environment render & Artist exhibits

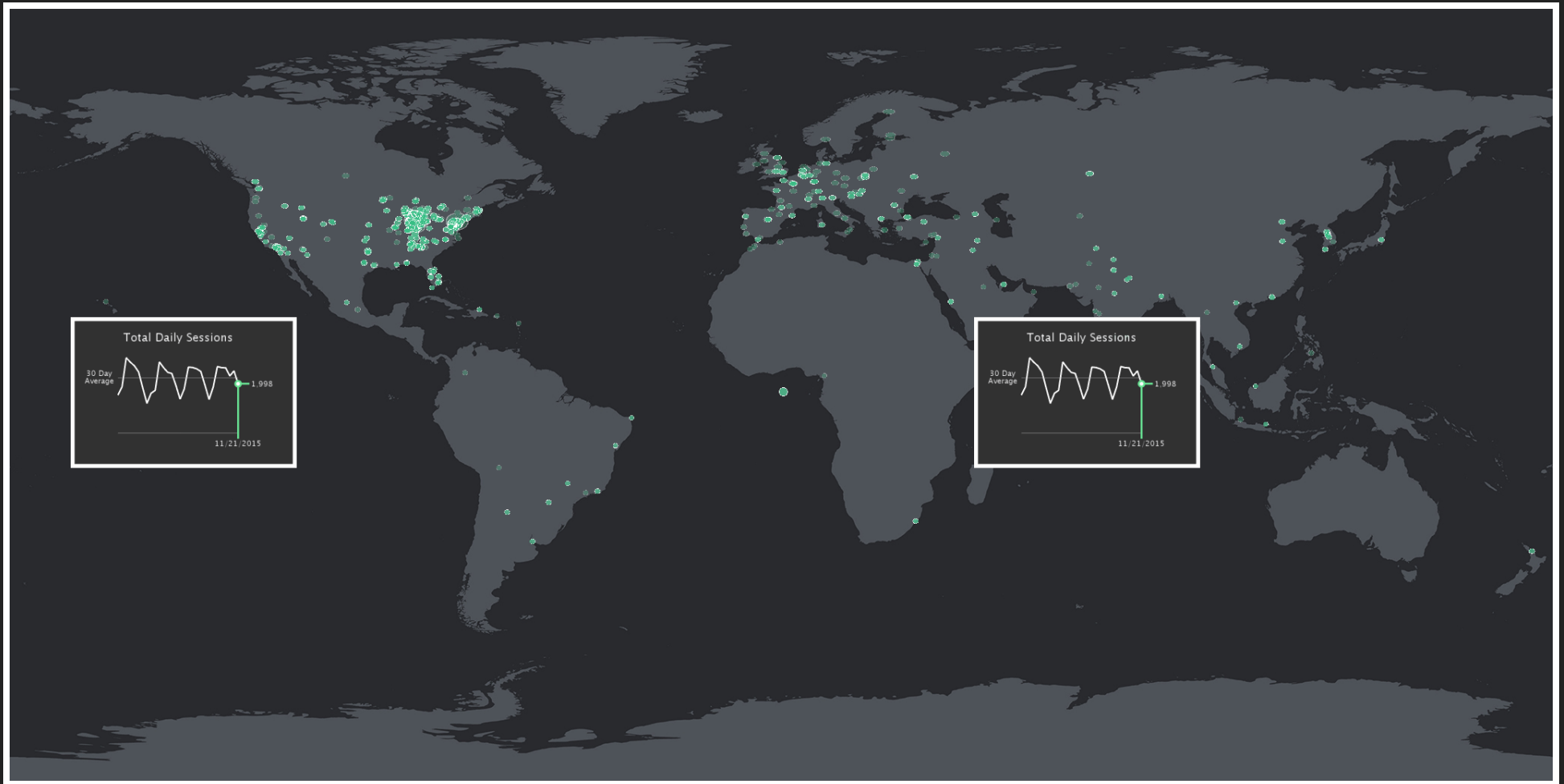


GOOGLE ANALYTICS

Daily Google analytics session & location data

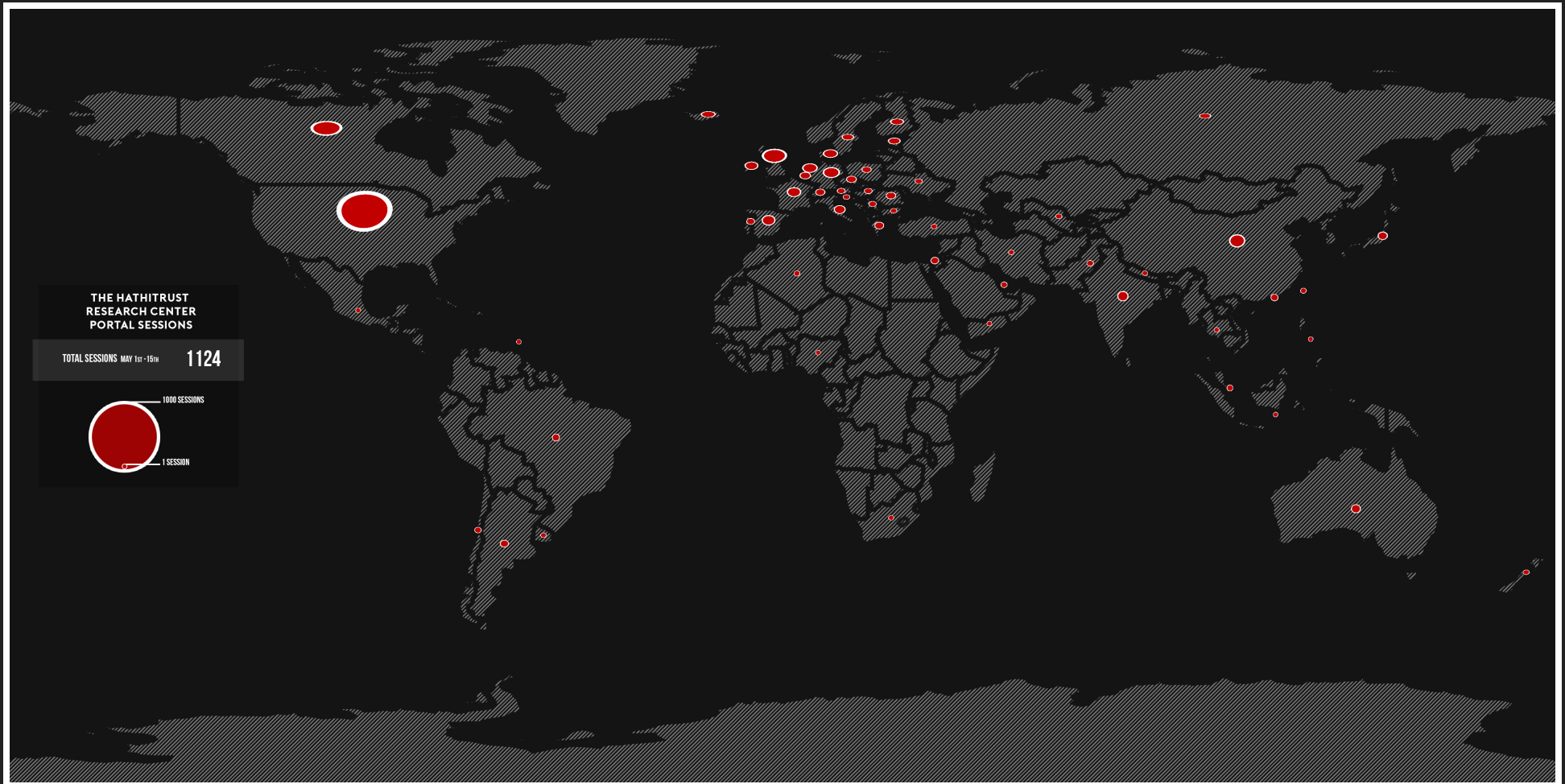


Individual Latitude and Longitude data



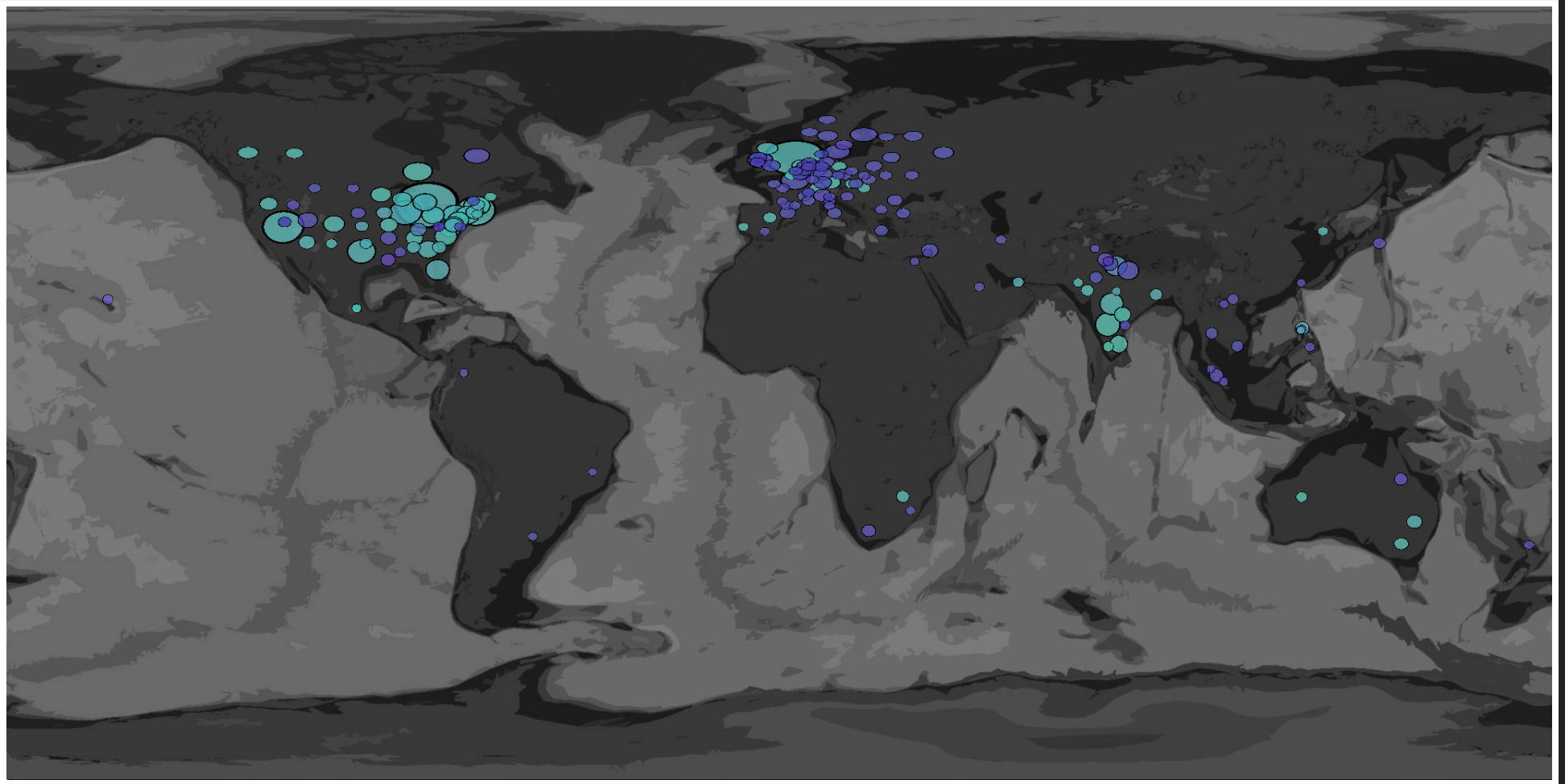
IUware - Student Accessed Site

Session data by region



HTRC Research Portal Site

Mixing Device Types



Desktop vs. Tablet use - IU Knowledge Base

GOOGLE ANALYTICS

- Requirements
 1. Access to data
 2. Clean Data - API
 3. Visualization - Processing

GOOGLE ANALYTICS

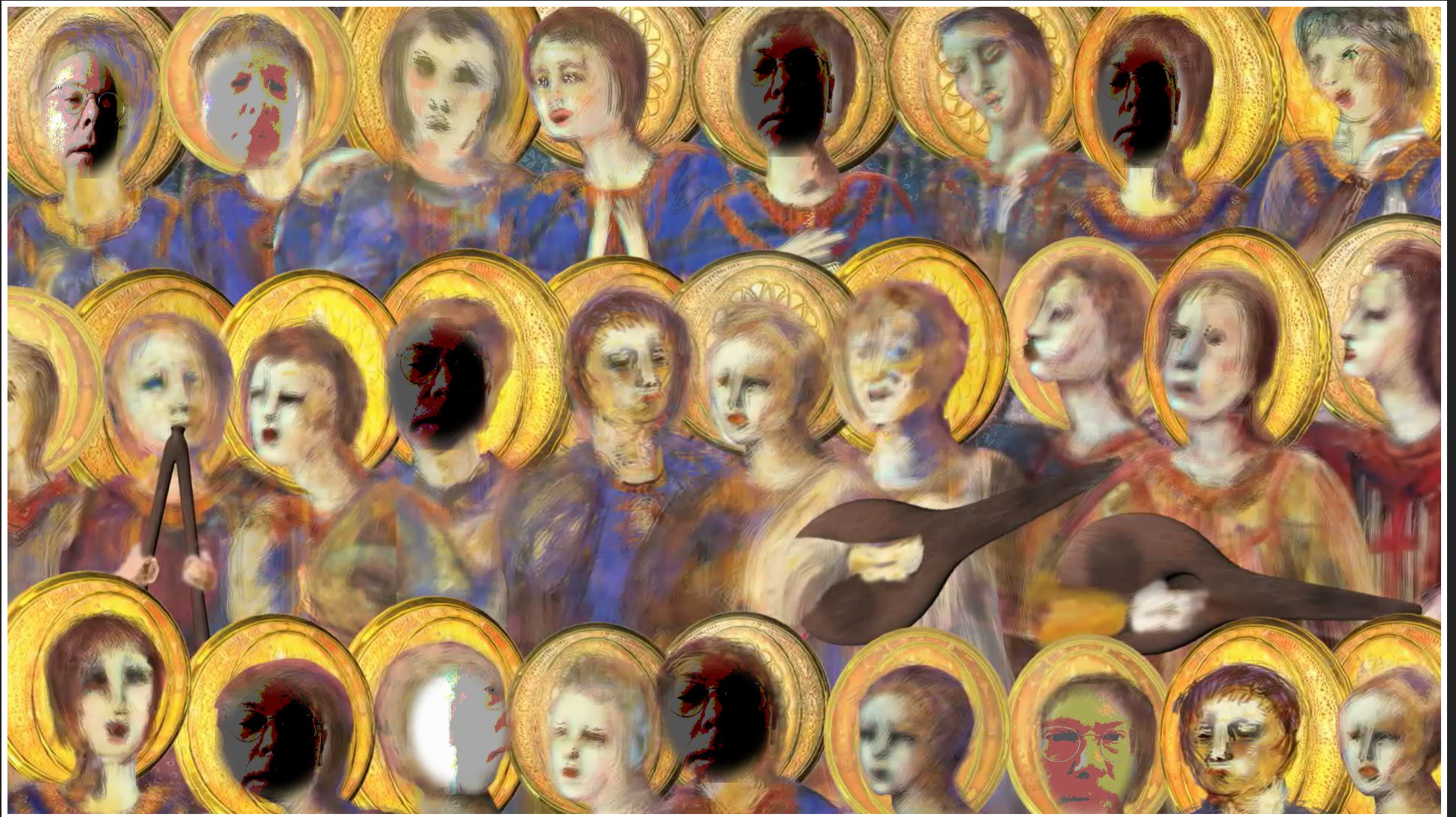
- Modular Workflow

1. Daily scheduled shell script runs
2. Calls google API script and retrieves data - examples available through google
3. Data saved into .CSV File
4. Processing Script takes data and generates Visualization
5. Shell script manages labeling images correctly and transferring to SOS

EMOTABLE SPHERE

SOS Version of Margaret Dolinsky's art project Emotable
Portraits





EMOTABLE SPHERE

- MaxMSP used to create and modify real time webcam video and export as image sequence
- Image Sequence transfered to SOS(FTP/SSH)
- Modified music visualization script created by Scott Muller that loads images onto SOS
- Did not account for distortion

GOOGLE STREET VIEW

STREET VIEW PANORAMAS FOR SOS



STREET VIEW WORKFLOW

1. User navigates to site, enters address
2. Site fetches panorama from Google Maps API
3. Site sends image data to server on SOS host
4. Server saves panorama in SOS format, updates playlist

Google Street Viewer | @thespite

A google street panorama viewer with WebGL using [GSVPano.js](#) and [three.js](#). Uses Geolocation API, Fullscreen API and Pointer Lock API if available.

You'll need [Chrome](#), [Firefox 8+](#), or another browser that supports [CORS](#) WebGL textures.

Check out the Floating Shiny Knot!

G+1

41



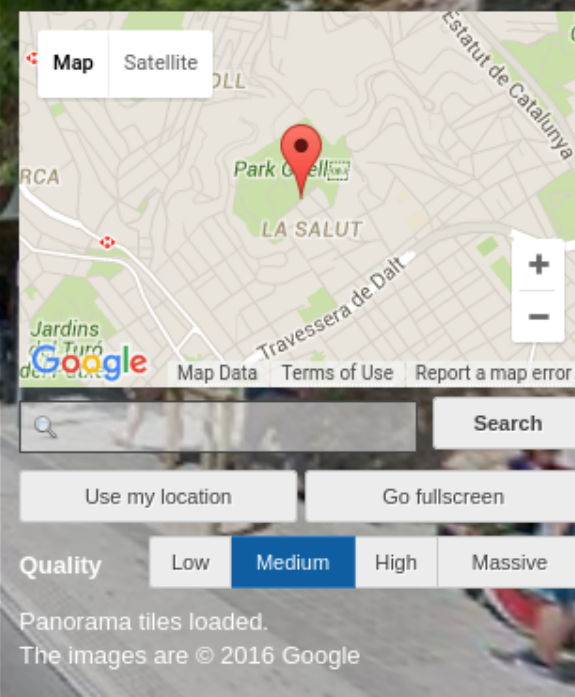
Tweet

[Find me on google+](#) | [Follow me on twitter](#)

How to use

[Fork me on GitHub](#)

Click and drag the panorama viewer. **Mouse wheel** to zoom in and out. Use the controls on the right to look for addresses and change image quality.



Google Street Viewer

<https://www.clicktorelease.com/code/street/>

Client

```
var canvas = mesh.material.uniforms.map.value.image;  
var data = canvas.toDataURL();  
...  
myhttp.send(data);
```

Server

```
var data = address.replace(/^undefineddata:image\/\w+;base64/, "");  
var buf = new Buffer(data, 'base64');  
fs.writeFile('/home/sos/image1.png', buf);
```



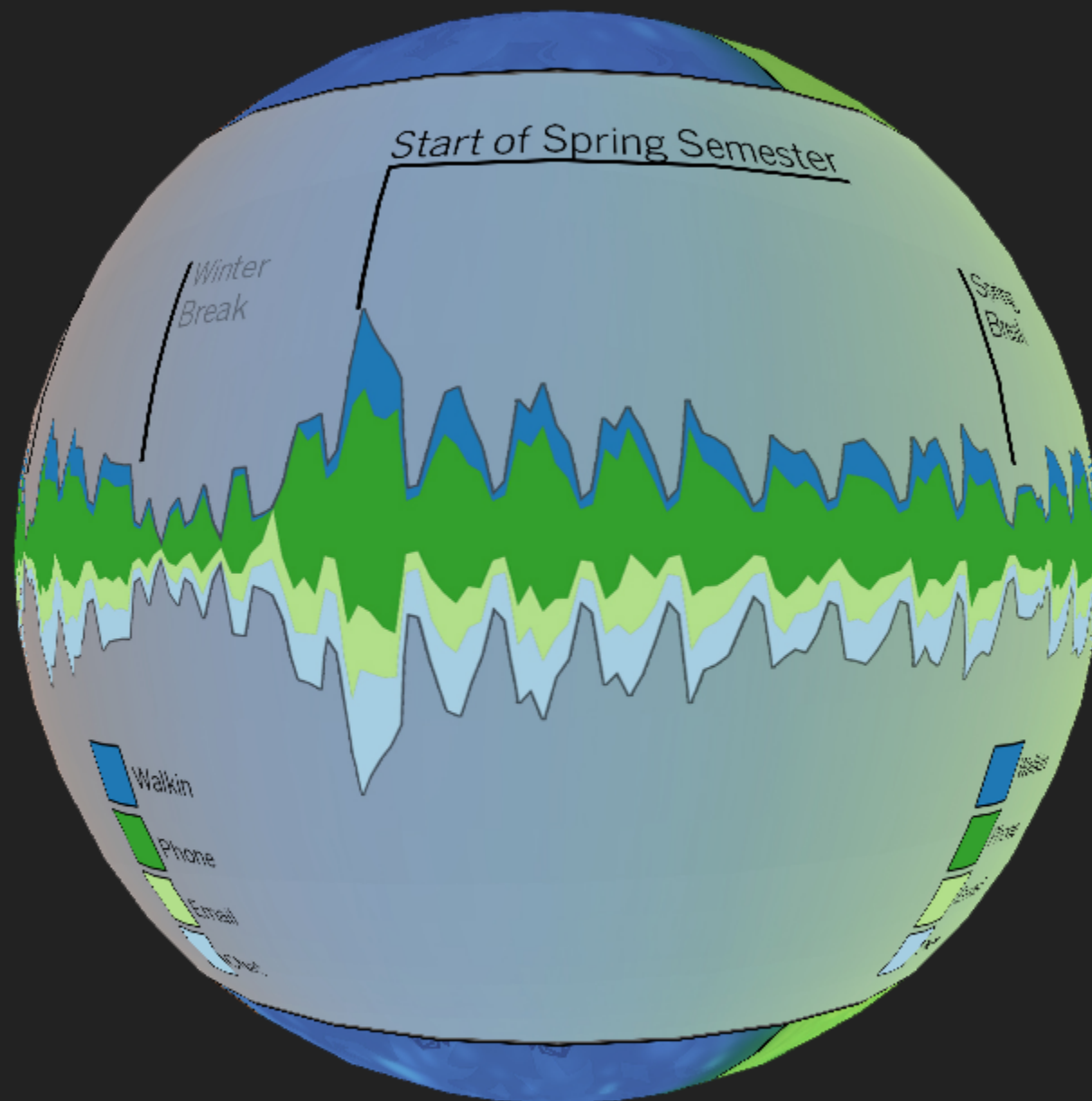

D3 ON A SPHERE

A WORKFLOW FOR USING D3.JS WITH SOS

1. Use D3 to generate SVG in the browser
2. Use SVG Crowbar to save SVG to a file
3. Use graphics editor to clean up, add annotations, etc
4. Create playlist on SOS

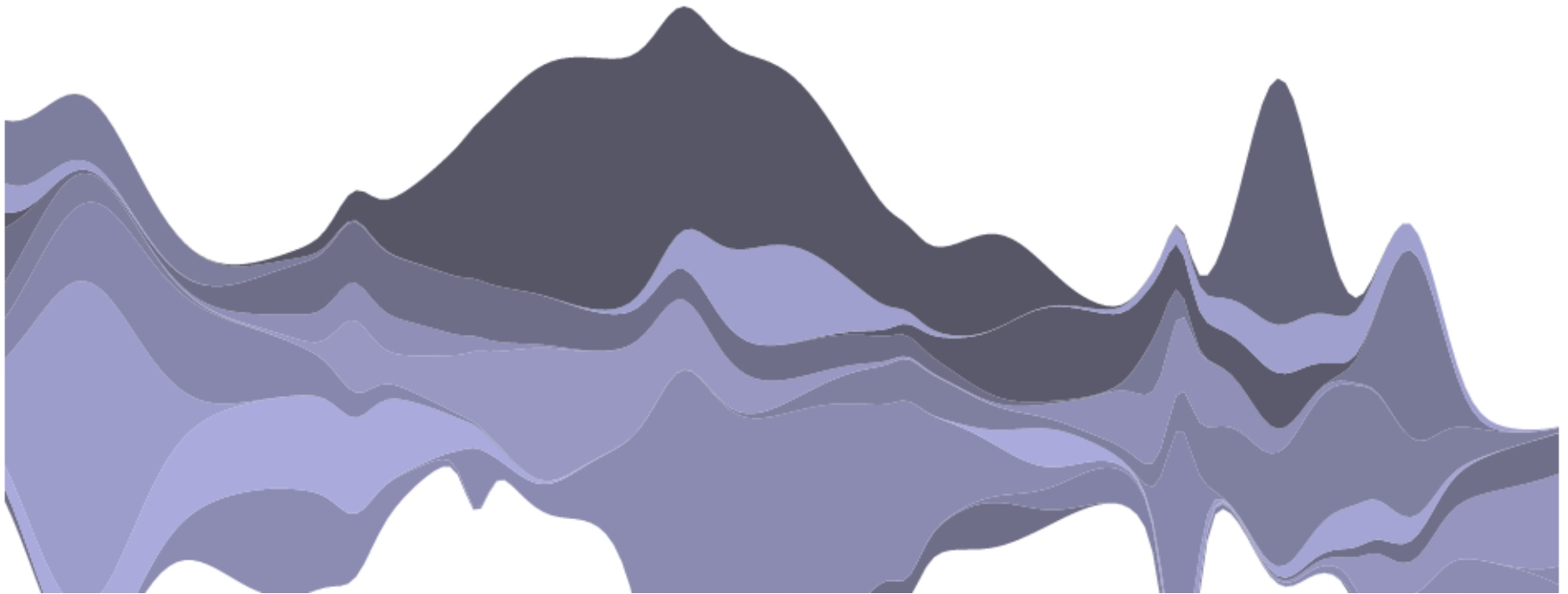
STREAMGRAPH FOR TIME SERIES

- Stacked bar chart wrapped around the equator
- Categories appear as colored *streams*
- Popularized by Last.FM listening histories



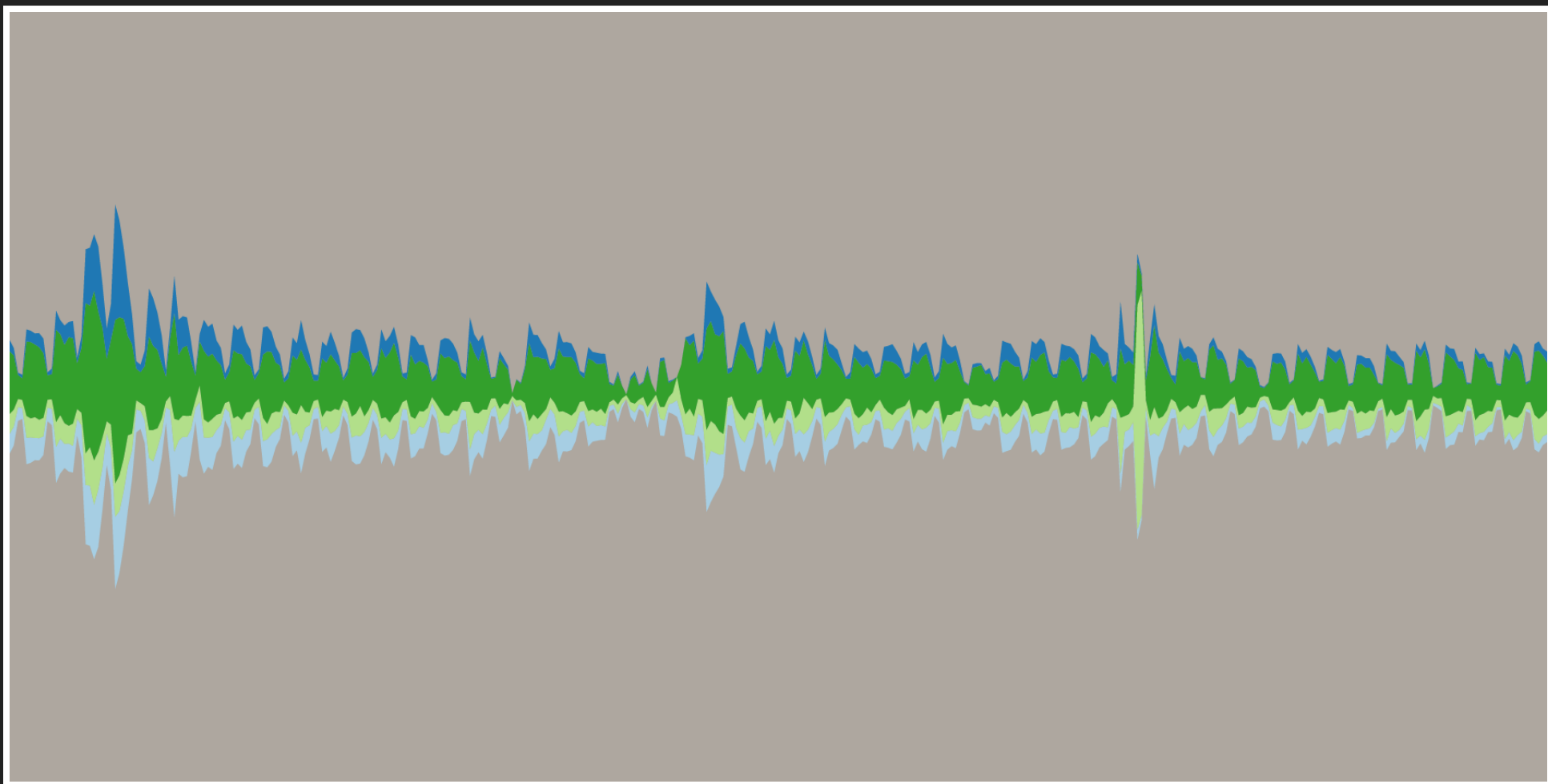
Streamgraph Chart

Update



D3 streamgraph example

<http://bl.ocks.org/lgrammel/1935509>



SVG Crowbar

A Chrome-specific bookmarklet that extracts SVG nodes and accompanying styles from an HTML document and downloads them as an SVG file—A file which you could open and edit in Adobe Illustrator, for instance. Because SVGs are resolution independent, it's great for when you want to use web technologies to create documents that are meant to be printed (like, maybe on newsprint). It was created with [d3.js](#) in mind, but it should work fine no matter how you choose to generate your SVG.

The Bookmarklet

SVG Crowbar ← Drag this to your bookmarks bar.

After you've installed the bookmarklet, you can execute it on any page. Go ahead and try it out on this [crazy map](#).

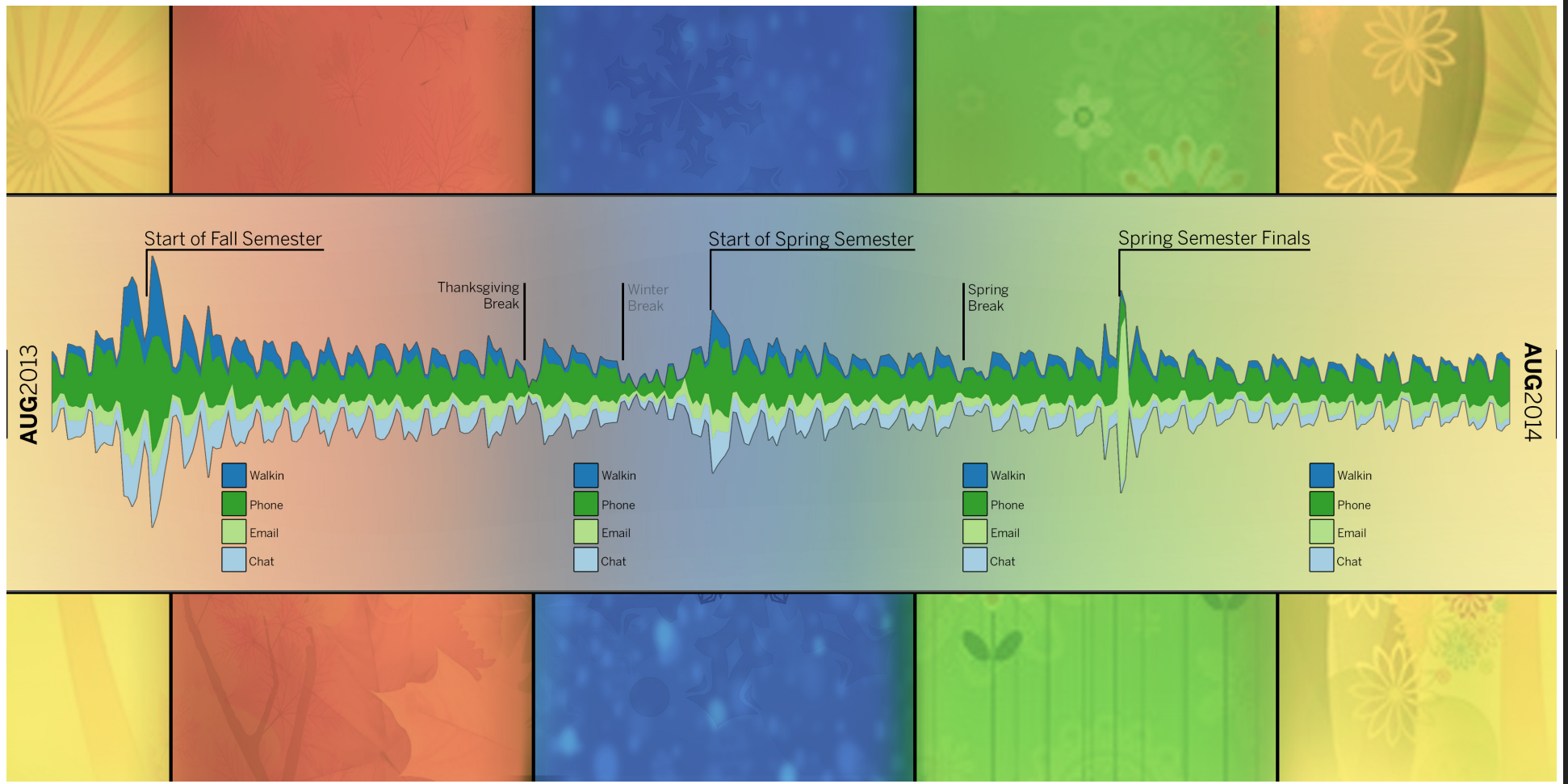
(You can click on the link instead to test it on this page immediately.)

Update

Some users reported that styles were not stored with the SVG files, so we added a new version that should work everywhere. The new method is slower, so loading can take a while on pages with many SVG elements. Still in beta.

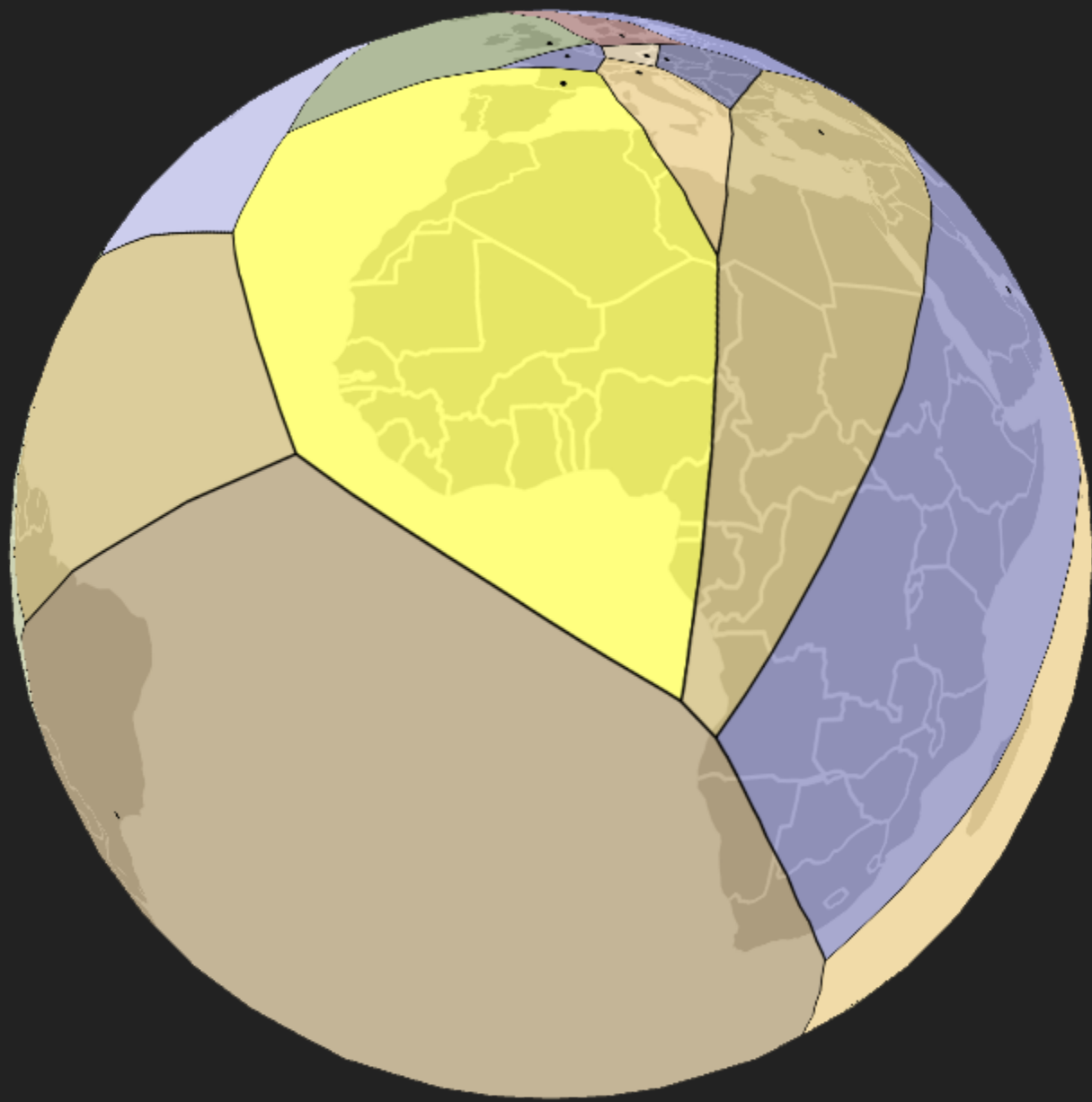
NYT SVG Crowbar

<https://nytimes.github.io/svg-crowbar/>

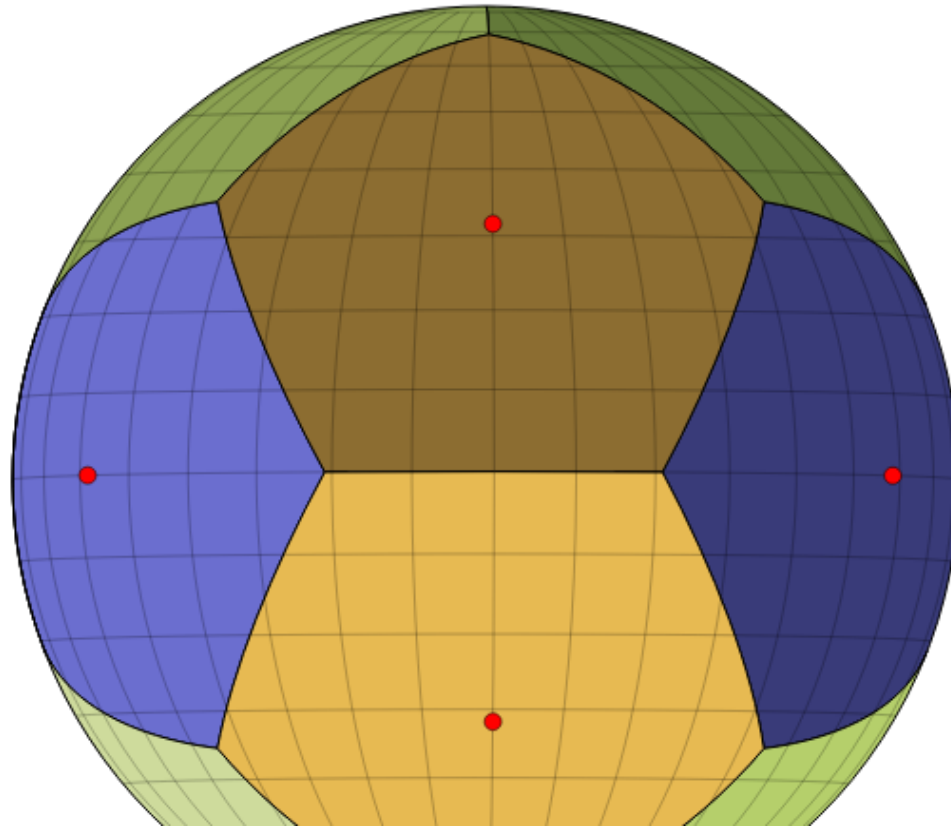


VORONOI DIAGRAM

1. Specify set of points
2. Calculate regions which are closest to each point

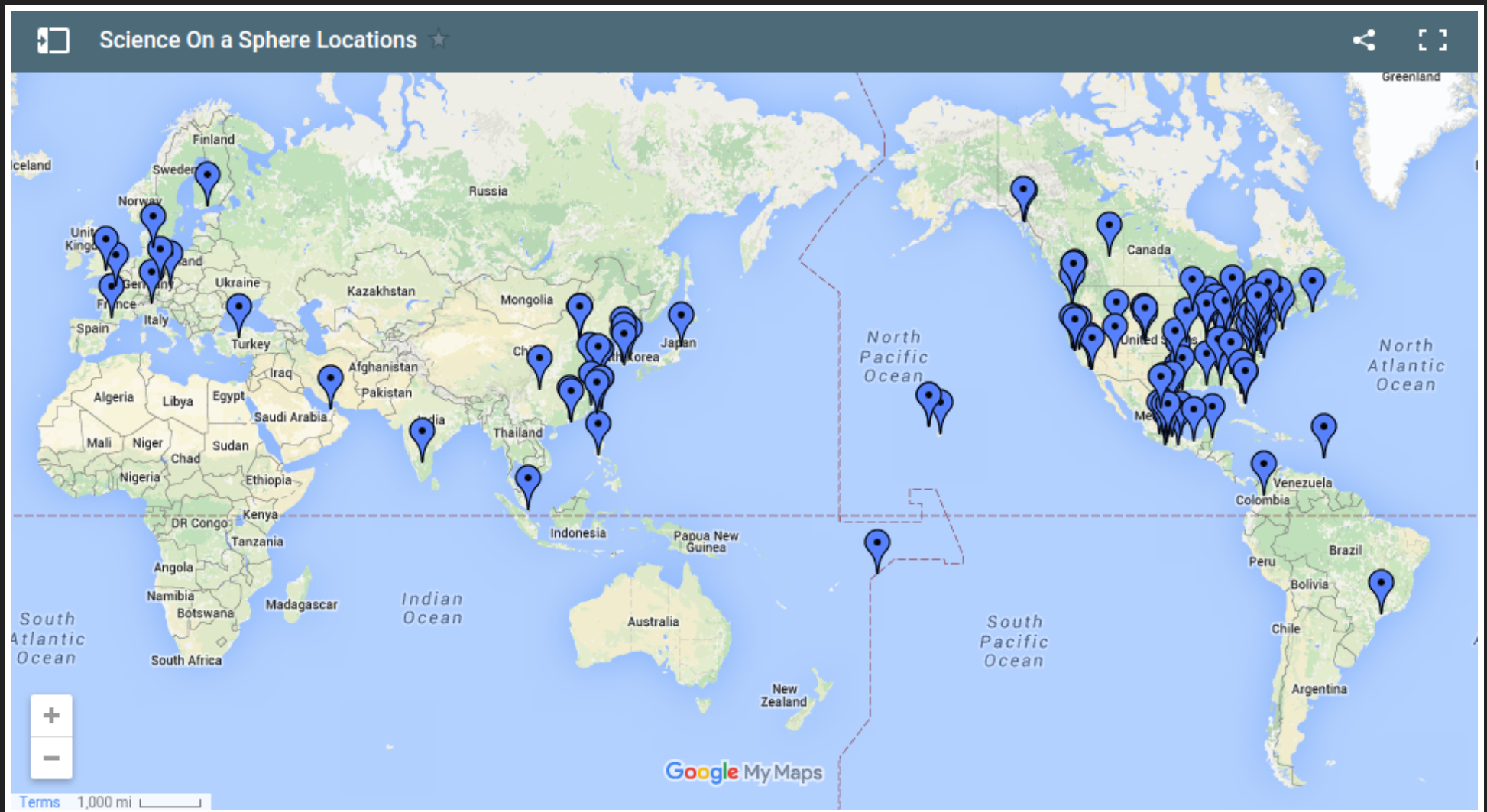


Spherical Voronoi Diagram



Jason Davies' Spherical Voronoi

<https://www.jasondavies.com/maps/voronoi/>



Download KML from SOS Locations

<https://www.google.com/maps/d/embed?mid=zWIHp2z9bzho.kHZ71NU6mNt8>

OpenSaveNewShareMetaunsaved

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-

Layers

Full Screen

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Info

MapboxSatelliteOCMOSM

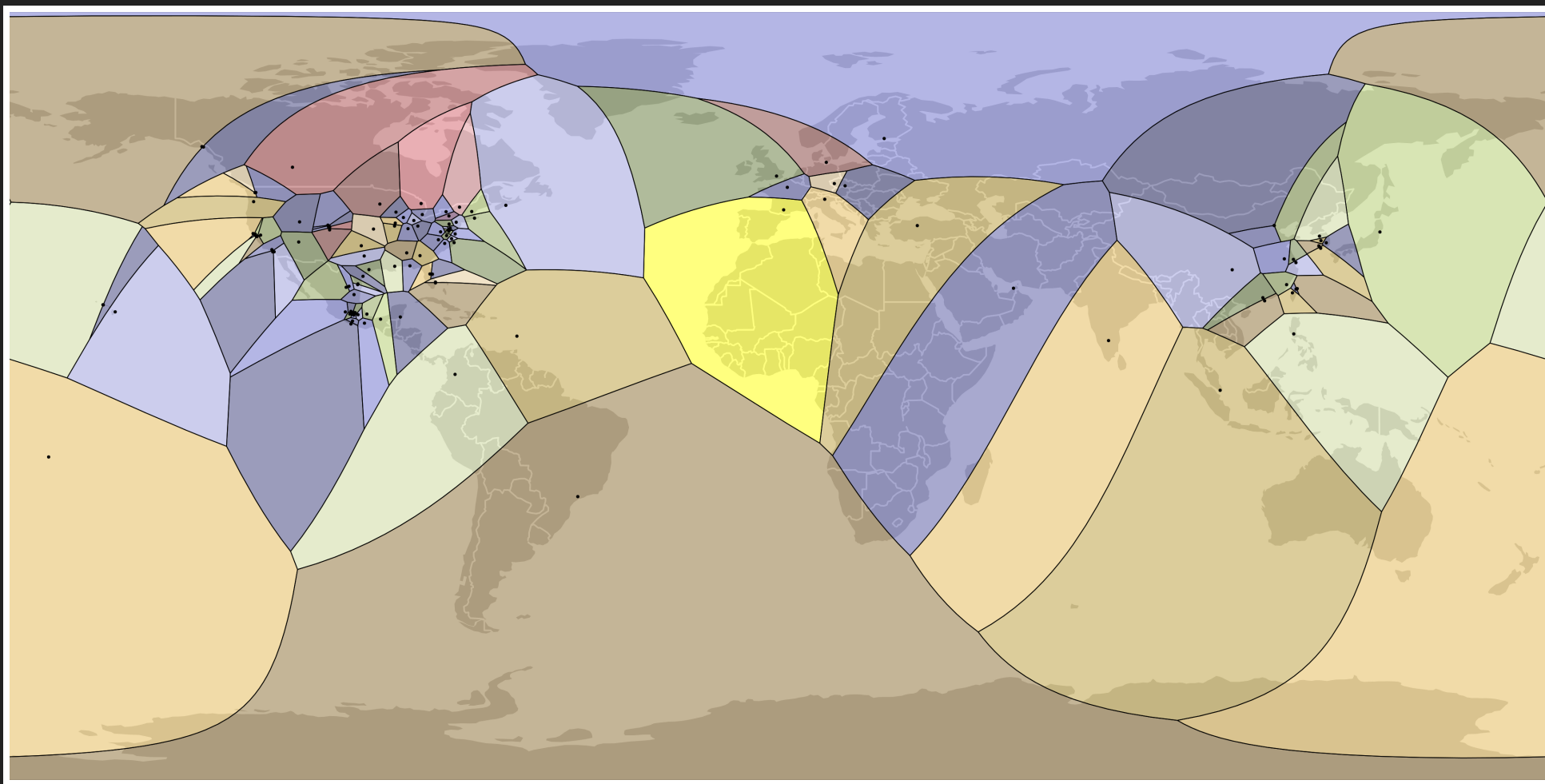
</> JSONTable? Helpanon | login

```
1 {
2   "type": "FeatureCollection",
3   "features": []
4 }
```

Convert to CSV using geojson.io

<http://geojson.io/>

1. Change spherical voronoi code to use equirectangular projection
2. Grab SVG with SVG Crowbar
3. Edit SVG with graphics editor



QUESTIONS?

FOR MORE INFO

<http://avl.iu.edu>

vishelp@iu.edu